

Amendment

Reply to Office Action dated December 18, 2007

**REMARKS**

The foregoing amendments and these remarks are in response to the Office Action dated December 18, 2007. This amendment is filed with a request for a three month extension of time and authorization to charge Deposit Account No. 50-0951 for the appropriate extension fees.

At the time of the Office Action, claims 1-15 were pending in the application. Claim 2 was objected to for minor informalities. Claims 1-15 were rejected under 35 U.S.C. §103(a). The objections and rejections are discussed in more detail below.

**I. Claim Objections**

Claims 2 was objected to for an informality which is corrected herein. Withdrawal of the outstanding objection is thus respectfully requested.

**II. Claim Rejections on Art**

Claims 1-2 and 6-8 are rejected under 35 U.S.C. §103(a) as being obvious over WO 00/43358 to Mennen et al. ("*Mennen*") in view of the article entitled "Use of high performance plate heat exchangers in chemical and process industries" to Reppich ("*Reppich*"). Claims 3-5 are rejected under 35 U.S.C. §103(a) as being obvious over *Mennen* in view of *Reppich* and further in view of the excerpt from the handbook by Rohsenow et al. Claims 9-10 and 12 are rejected under 35 U.S.C. §103(a) as being obvious over *Mennen* in view of *Reppich* and further in view of U.S. Patent No. 4,519,446 to Elmore et al. ("*Elmore*"). Claims 13-15 are rejected under 35 U.S.C. §103(a) as being obvious over *Mennen* in view of *Reppich* and further in view of U.S. Patent No. 888,169 to Heizmann. Claim 11 is rejected under 35 U.S.C. §103(a) as being obvious over *Mennen*, *Reppich* and *Elmore* and further in view of U.S. Patent Application Publication No. 2001/0045276 to Obashi. The Applicant respectfully submits that claim 1 is patentable over the cited prior art.

Notably, the plant according to present claim 1 differs from the plant disclosed in *Mennen*, which is considered as the closest prior art, at least because the condensation unit comprises a plurality of flattened plate-shaped essentially rectangular heat exchangers arranged with long sides parallel to the axis of the reactor. The main effect resulting from the above distinguishing features is the possibility of realizing a plant for urea production with a much

higher overall urea production capacity than that which can be obtained with the plant according to *Mennen*.

It should be noted that a person of ordinary skill in the art faced with the problem of increasing the production capacity of a urea plant can choose between a large number of possibilities. Just to mention some, it could have been possible to modify the scrubber, the stripper and/or the operating condition of the stripper in the high-pressure synthesis section, or it could have also been possible to modify the urea recovery section, which is downstream to the high-pressure synthesis section. Therefore, the choice of modifying the condenser of the high-pressure section in order to solve the above-identified problem should be regarded as a particular choice among several alternatives.

It should also be noted that a person of ordinary skill in the art aiming to increase the plant production capacity of *Mennen* by modifying the condenser placed inside the reactor is again faced with several alternatives. For instance the skilled person could have placed one or more condensers, connected in series, outside the reactor so as to achieve the desired capacity, as is common in the art. Contrary to this teaching, the presently claimed plant advantageously solves the above problem by positioning a condenser made of a plurality of plate-shaped heat exchangers inside the reactor. There is no teaching or suggestion in the urea technical field to place this kind of apparatus within the high pressure urea synthesis reactor to perform the operation of the condensation unit of a urea production plant.

With respect to *Reppich*, it is noted that this reference merely relates to the use of plate heat exchangers in the chemical industry in general. None of the examples given at page 1008, chapter 7 in connection with Table II can be compared or confused with the technical field of a urea production plant. Moreover, none of the features and advantages mentioned at page 1000 of *Reppich* can be directly and unambiguously referred to the problem of increasing the urea production capacity of a urea plant.

Thus, it is clear that a skilled person starting from *Mennen* and faced with the above-identified technical problem would have not considered *Reppich* (which is a general disclosure about heat exchangers in the chemical industry) as a relevant prior art document and in any case would have found no hints in *Reppich* which would have directed him towards the claimed solution to the problem, the latter being only possible with the exercise of an inventive skill.

Moreover, there is no hint in the prior art of the several further advantages obtained by the claimed plant.

In fact, in addition to the possibility of increasing the plant urea production capacity, in the presently claimed plant it is further possible to increase the conversion yield of the synthesis reactor, which also is easier to manufacture and to maintain than the reactor of *Mennen*. As clearly stated at page 16, lines 3 to 17 of the present application, the condensation unit with the plate-shaped heat exchangers placed inside the reactor allows obtaining, for instance, better condensation performances with respect to the condensation unit of *Mennen*, thus improving the efficiency within the adjacent reaction zone to all advantage of the conversion yield. Due to the claimed urea plant, an increase in the urea production capacity can be obtained with respect to the prior art and at the same time an increase in the conversion yield is also obtained as well as a reduction in the overall energy consumption and in the manufacturing, operating and maintenance costs.

Finally, applicant notes that *Reppich* discusses plate heat exchangers that are arranged in rectangular configurations. See for example, fig. 1 of *Reppich* showing the gasketed plate heat exchanger. As the present application relates to urea production plants which typically have generally cylindrical synthesis reactors, there is clearly no teaching in *Reppich* as to how a person of ordinary skill in the art could include plate-shaped heat exchangers in a cylindrical reactor. Claim 1 is thus amended to clarify this difference. Thus, any combination of *Mennen* and *Reppich*, even if made, would not result in a plant having all of the limitations recited in claim 1.

Therefore, the subject matter of present claim 1 is patentable over the cited prior art and allowance of claim 1 is appropriate. The above arguments also apply to dependent claims 2-15, which are believed allowable because of their dependence upon an allowable base claim, and because of the further features recited therein.

### **III. Conclusion**

Applicant has made every effort to present claims which distinguish over the prior art, and it is thus believed that all claims are in condition for allowance. Nevertheless, Applicant invites the Examiner to call the undersigned if it is believed that a telephonic interview would expedite the prosecution of the application to an allowance. In view of the foregoing remarks,

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Applicant respectfully requests reconsideration and prompt allowance of the pending claims.

Respectfully submitted,

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